The Digital Difference

Responsible Conduct *of* RESEARCH *in a* Networked World

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The Graduate School
THE UNIVERSITY OF KANSAS

CONTENTS

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INTRODUCTION

Information technology is not new to higher education. Some of the earliest computers were developed in university research labs, as were early software applications aimed at enhancing the use of technology for teaching. By the 1960s, advances in computing opened the way to advanced quantitative research designs in the social sciences, and by the 1990s digital representations of works of art and a wide variety of literary works permitted new approaches to scholarly inquiry in the humanities. In each case, advances in information and communication technology (ICT) made a "digital difference," allowing for new modes of teaching and research that became part of the professional environment in higher education. Today, we live in a world in which increasingly rapid advances in technology and the creative application of new technologies to the work of students, scholars, librarians, and researchers pose a variety of challenges to college and university faculty, as well as to other professionals. In a networked world, the "digital difference" in teaching and research has become a ubiquitous concern.

The digital representation of knowledge in the form of images, electronic journal articles and books, datasets, and primary source material (e.g., manuscripts and other personal papers) and nearly universal access to networked communication in institutions of higher education and other organizations make it possible for both raw data and processed information to be copied and shared with extraordinary ease. Although much of the public debate about copying has revolved around the illegal sharing of popular materials such as music and video files, the evolution of digital forms of scholarly communication and the availability of high-speed networks and vast storage capacities on personal computers and portable hard drives have turned questions related to copyright and access to information into key ethical issues in higher education.

Copyright concerns are familiar to teaching faculty in the compilation of course readers or reserve collections. How much can I include in my reader before my students will have to pay a fee? Why can't I place multiple copies of a large section of a book on electronic reserve? Such questions continue to plague professors facing the digital difference in their classrooms, but there are a variety of other questions related to copyright that must also be considered by anyone teaching or conducting research in the collegiate environment. What rights do I retain to my scholarly work when I submit a manuscript for publication? How much of my own work can I freely share with my students and colleagues? Respect for the

copyright of authors and publishers, concern about equitable and ongoing access to the fruits of scholarship, and commitments to the responsible dissemination and stewardship of intellectual property vie for attention in the increasingly busy lives of students, teachers, researchers, librarians, and other professionals.

In this digital environment, publishers are rightly concerned about the need to protect the contents of their journals, books, databases, and other products against widespread copying that might rob them of revenue and undermine their fiscal viability. Similarly, scholarly societies and cultural heritage organizations (e.g., museums) are concerned about protecting the publications and images that represent important sources of revenue. At the same time, however, scholarly authors are most interested in assuring the greatest impact for their work through widespread dissemination and citation, and researchers demand convenient and timely access to the results of their colleagues' scholarly inquiry. Easy sharing of research results within the community of scholars is taken for a basic right so long as proper attributions of authorship are respected. In a world in which publishers are increasingly resorting to complicated licensing and pricing frameworks as a means of protecting their capital investment, how can a researcher still act responsibly in the choices he or she makes for the publication and dissemination of his or her work?

These issues extend beyond the academy, as well. Citizens of the United States and other countries expect a clear demonstration of the value of scholarly research, including ready access to the results of research that is often conducted at taxpayer expense through grants and other subsidies. Research in many disciplines—medical research, especially—has important implications for public policy and public health and needs to be made widely available. How is the public's right to "open access" to the results of such research to be balanced against the interests of publishers, researchers, scholarly societies, libraries, and other cultural heritage organizations?

The rapid evolution of information and communication technology over the past decade and changes in public and professional expectations regarding digital access to the fruits of scholarly research have had a profound effect on the ways in which scholarly inquiry is designed, how the results of such inquiry are shared, re-used, or re-packaged, and how the various types of digital information are integrated into the teaching and learning process. Individual disciplines have changed in different ways, of course, but each has been forced in some degree to confront the digital difference in its scholarly work. Individual students,

teachers, researchers, and scholars have more choices than they once did, and with greater choice comes greater responsibility. This handbook is designed to outline some of the most significant of these choices—and the consequences of individual decisions—associated with creating, using, sharing, and teaching information found or communicated in the digitally networked environment.

TEACHING FOR RESPONSIBILITY

Plagiarism and Instruction in the Ethics of Information Use

No discussion of the "digital difference" in the world of higher education can progress very far before coming to issues of academic integrity and the problem of plagiarism from the Internet. Has access to the wealth of information resources on the World Wide Web really increased the frequency of student plagiarism? If so, what can we do both to maintain academic integrity in our classrooms and to effectively integrate into our teaching instruction in the ethics of information use in a networked environment?

➤ What is Plagiarism?

Plagiarism is one of the few features of academic life that is widely known outside the academy. High-profile cases such as those of Stephen Glass at *The New Republic* and Jayson Blair at the *New York Times*, along with charges against popular authors such as Stephen Ambrose and Doris Kearns Goodwin, have demonstrated how widespread is the problem of plagiarism. However, although many people believe that they would "know plagiarism if they saw it," it is a complex issue. Wilhoit (1994) noted this a decade ago when he concluded that:

Defining plagiarism is not as simple as one might think. Everyone seems to know it is wrong, including those who commit the offense, but few know how to completely define it. There are auto-plagiarism and self-plagiarism, substantial plagiarism and incidental plagiarism, and finally there is unconscious plagiarism . . . which seemingly would allow an excuse to all but the most obvious plagiarists" (161).

If we are to teach students how to avoid plagiarism, we must first be clear about what it means to plagiarize.

Every academic institution has a slightly different definition of plagiarism—often found in an honor code or in other published guidelines related to student conduct or academic integrity—but plagiarism may be defined most succinctly as any act by which you appropriate the words or ideas of another and pass them off as your own. One may also identify a variety of specific actions that can be considered under the broader rubric of plagiarism.

Plagiarism is:

- Copying information from a source text without attribution.
- Paraphrasing information from a source text without attribution.
- Turning in a peer's work as your own.
- Purchasing a paper from a commercial source ("term paper mill").

Source: Wilhoit, S. (1994). Helping students avoid plagiarism. College Teaching, 42 (4), 161-164.

None of these types of plagiarism is unique to the electronic environment, but there is evidence to suggest that the problem has become worse in recent years.

➤ Plagiarism in the Networked Environment

"A new epidemic of fraud is sweeping through our schools," or so noted a cover story on Internet plagiarism in *U.S. News & World Report* in 1999 (cited in Scanlon & Neumann 2002, 374), but does access to the Internet really increase the frequency with which students engage in one or another form of plagiarism?

What evidence we have suggests that it may. While only 10% of student respondents to a survey conducted through the Center for Academic Integrity in 1999 reported engaging in "cut-and-paste plagiarism," that percentage had increased to 41% in a 2001 follow-up study (Center for Academic Integrity 2002–2003). A similar study of students at nine institutions across the country in 1999–2000 found that almost 25% reported regularly using "cut-and-paste" to add text to their papers without appropriate attribution (Scanlon & Neumann 2002). What is it about the Internet that makes a "digital difference" in student behavior?

Several researchers have suggested that the liberal approach to "ownership" of information on the World Wide Web may be influencing student attitudes and behaviors in this regard. As Scanlon (2003) wrote:

Widespread use of the Internet may be shaping a new generation of students' conception of "fair use," leading them to view the mass of information so freely shared in cyberspace as public knowledge . . . . For a generation raised on Napster, as well as for many others who regularly work and play within online communities, questions of ownership on the Web have become deeply problematic (161, 164).

Another factor shaping student behavior is the very problem noted above of clearly defining plagiarism. At what point does collaboration become collusion and "fair use" become "plagiarism," and how consistent are we across a department or campus in making these distinctions clear (Auer & Krupar 2001)? Finally, there is convenience. Unlike traditional plagiarism, which required a visit to the library to collect resources and some investment of time to copy or re-key source text, the wired campus brings source materials directly to the student's desktop, and a few simple keystrokes are all that is needed to transfer a phrase, paragraph, or page from the source text to the student paper. An effective discussion of these (and other) issues can be found through the Web site of the University of Alberta Libraries http://www.library.ualberta.ca/guides/plagiarism/why/index.cfm.

Fighting Fire with Fire: Using Information Technology to Combat Internet Plagiarism

Much of the discussion about how to combat Internet plagiarism revolves around alerting faculty, writing program administrators, and others to the tools available to aid their efforts. A representative faculty development workshop on the problem of plagiarism at the State University of New York at Plattsburgh, for example, includes an entire section on "plagiarism detection" using print and electronic resources (Heller-Ross 2003). At the University of Kansas, the KU Writing Center provides access to one of the most popular of these resources, Turnitin.com http://www.turnitin.com/. This service purports to effectively detect plagiarism by comparing the text of individual submissions against the language found across "billions of pages of content located on the Internet and [their] proprietary databases." Instructors who choose to make use of Turnitin.com receive training in the use of the service through the KU Writing Center and are asked to include a special notice in their class syllabi.

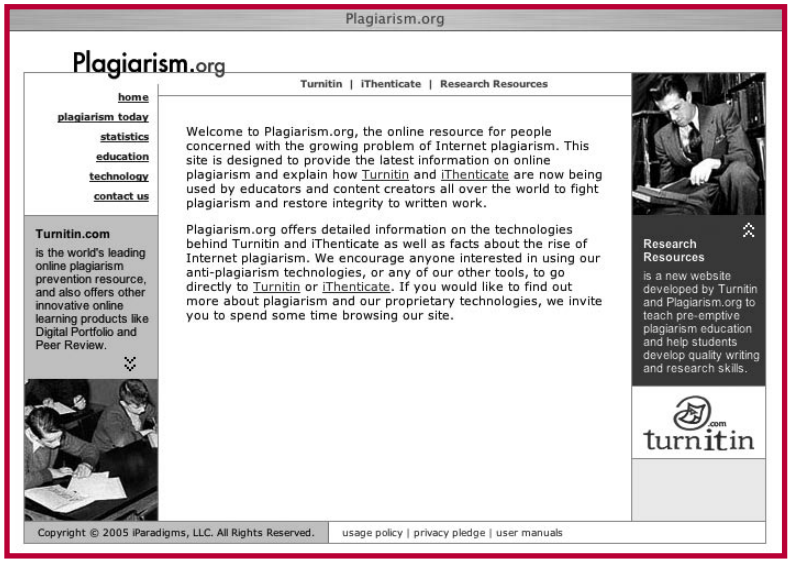
Turnitin.com
http://www.turnitin.com/

The issue of digital plagiarism has raised concerns about ethics, student writing experiences, and academic integrity. KU subscribes to a digital plagiarism detection program called Turnitin.com, which may be used to check papers submitted in this course. You may be asked to submit your papers in a digital format (e-mail attachment, BlackBoard™ digital drop box or on disk) so that your paper can be checked against web pages and databases of existing papers. Although you may never have engaged in intentional plagiarism, many students do incorporate sources without citations; this program can alert me to your academic needs. Please consider the use of the program as a learning tool for all of us.

Source: KU Writing Center. The University of Kansas. (2004). *Deterring plagiarism with Turnitin.com.* Retrieved January 24, 2005, from http://www.writing.ku.edu/instructors/turnitin.shtml

While Turnitin.com remains one of the most popular of these "plagiarism detection systems," a variety of others also exist, including EVE2 (Essay Verification Engine), and CiteMaster. These and other applications are discussed in detail in Groark, Oblinger, and Choa (2001) and Heller-Ross (2003).

In addition to these proprietary technology tools, there are a number of other ways in which technology can be turned to the challenge of combating Internet plagiarism. Many instructors, for example, have simply entered suspicious phrases into the Google search engine and found unacknowledged source texts freely available on the Internet. Others maintain current awareness about new tips and tools for "fighting fire with fire" by visiting sites such as Plagiarism.org: http://www.plagiarism.org.



Plagiarism.org: http://www.plagiarism.org.

While still imperfect, tools such as Turnitin.com are useful and have a place in our work in dealing with the problem of plagiarism in the networked environment, but focusing solely on the use of such tools turns us more into detectives and less into teachers (Scanlon 2003). How can we help our students learn enough about the conventions for scholarly writing, the quality of different resources available through the World Wide Web, and the ethics of information use to prevent incidents of plagiarism before they occur?

➤ Teaching for Responsibility, Teaching for Integrity

In some cases, again, technology provides a mechanism for effective instruction. A number of institutions have developed Web-based tutorials that introduce students to basic conventions of scholarly writing and citation of sources, for example, and these tutorials may be assigned as part of the requirements for a course that will require independent research and writing. Tutorials of this sort typically include discussions of:

- local academic regulations governing academic integrity;
- different types of plagiarism;
- how to recognize plagiarism in your own work and that of others;
- how to avoid plagiarism through appropriate citation of sources.

A Selection of Online Tutorials

- School of Education. Indiana University. (2004). *How to recognize plagiarism.*
  Retrieved January 24, 2005, from http://www.indiana.edu/~istd/
- Scholarly Communication Center. North Carolina State University Libraries. (2003). *Plagiarism tutorial.*
  Retrieved January 24, 2005, from http://www.lib.ncsu.edu/scc/tutorial/plagiarism/index.html
- University of California at Los Angeles Library. (n.d.). *Bruin success with less stress.*
  Retrieved January 24, 2005, from http://www.library.ucla.edu/bruinsuccess/
- University of Maryland University College. (2003-2004). *VAIL: Virtual Academic Integrity Laboratory.*
  Retrieved January 24, 2005, from http://www.umuc.edu/distance/odell/cip/vail/home.html
- University of North Carolina at Chapel Hill Libraries. (2004). *Plagiarism and the honor code.*
  Retrieved January 24, 2005, from http://www.lib.unc.edu/instruct/infoethics/plagiarism/index.html

Often these tutorials will also include a discussion of how to critically evaluate the content found on a specific Web page or Web site in order to determine if its use is appropriate in academic research. Recently designed tutorials such as *Bruin Success with Less Stress* also include broader discussions of responsible use of information technology, e.g., discussions of the use of file-sharing software on campus and the problem of illegal downloading of music and video files.

In addition to assigning student completion of tutorials such as these, instructors should include a classroom discussion of academic integrity in their plans for the semester (Scanlon 2003).

Guidelines for Discussion of Academic Integrity in the Classroom

1. Discuss plagiarism as an ethical issue and the need for academic integrity in the scholarly community.
2. Discuss the benefits of citing sources properly and including complete information for resources found on the World Wide Web.
3. Distribute a paper found through an online term paper mill and critique it in class.
4. Address the problems that students may face in critically evaluating the quality of resources found on the World Wide Web and provide for instruction in effective search strategies and Web site evaluation through your local library.
5. Clearly outline penalties for academic dishonesty and remind students of local codes of conduct, honor codes, etc.

Source: Adapted from University of Alberta Libraries. (2004). *A faculty guide to cyber-plagiarism.* Retrieved January 24, 2005, from http://www.library.ualberta.ca/guides/plagiarism/

As suggested above, instructors may be assisted in developing instruction in the responsible use of information by academic librarians. Many of the resources cited throughout this section were developed by librarians, either in collaboration with instructional faculty, or based on the relevant section in the Association of College & Research Libraries' "Information Literacy Competency Standards for Higher Education" (2000). These standards, recently endorsed by both the American Association of Higher Education and the Council of Independent Colleges, outline a five-point curriculum designed to assure that the college graduate has learned to "recognize when information is needed, and have the ability to locate, evaluate, and use effectively the needed information."

ACRL Information Literacy Competency Standards for Higher Education

Standard Five

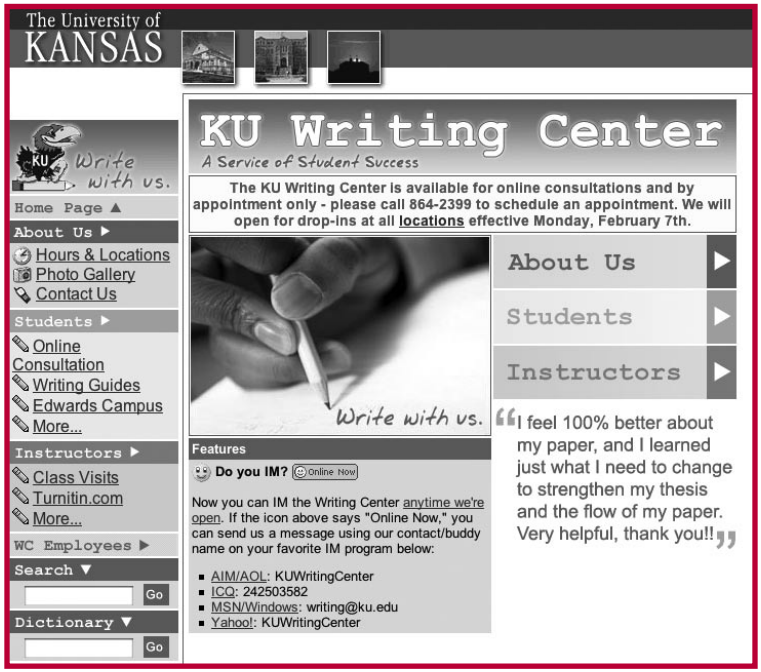
The information literate student understands many of the economic, legal, and social issues surrounding the use of information and accesses and uses information ethically and legally.

Performance Indicators

1. The information literate student understands many of the ethical, legal, and socio-economic issues surrounding information and information technology.
2. The information literate student follows laws, regulations, institutional policies, and etiquette related to the access and use of information resources.
3. The information literate student acknowledges the use of information sources in communicating the product or performance.

For additional detail on instructional objectives related to these performance indicators, see http://www.ala.org/ala/acrl/acrlstandards/informationliteracycompetency.htm.

At the University of Kansas, instructors may collaborate with faculty and staff both in the KU Libraries http://www.lib.ku.edu/Instruction/ and in the KU Writing Center http://www.writing.ku.edu/ to design course materials, class assignments, or assessment activities aimed at fostering student learning about responsible and ethical use of information resources.



KU Writing Center
http://www.writing.ku.edu/


literary
testator's literary
lished works etc.
lit·er·ate
n. someone who can
ature

Much of this handbook is taken up with issues related to what you will do with the results of your research once you have completed it, but we must also consider some of the effects of information technology on research design.

Information and communication technologies such as electronic mail (e-mail) and the World Wide Web (Internet), for example, have the potential to vastly improve your ability to contact potential participants for your research studies. For select populations who are connected and technologically savvy, the cost, ease, speed of delivery and response, ease of data cleaning and analysis all weigh in favor of the Internet as a delivery method for survey research (Shannon, et al. 2002).

The survey method has long been a popular research design in the social sciences, and it has benefited enormously from the rise of new information and communication technologies (Dillman 2000). A number of questions about how those technologies will be employed in the design, dissemination, and preservation of such research in digital form must be answered ahead of time by the responsible scholar.

➤ Designing Survey Research in the Electronic Environment

How often has something like the following come across your personal computer during the past few years?

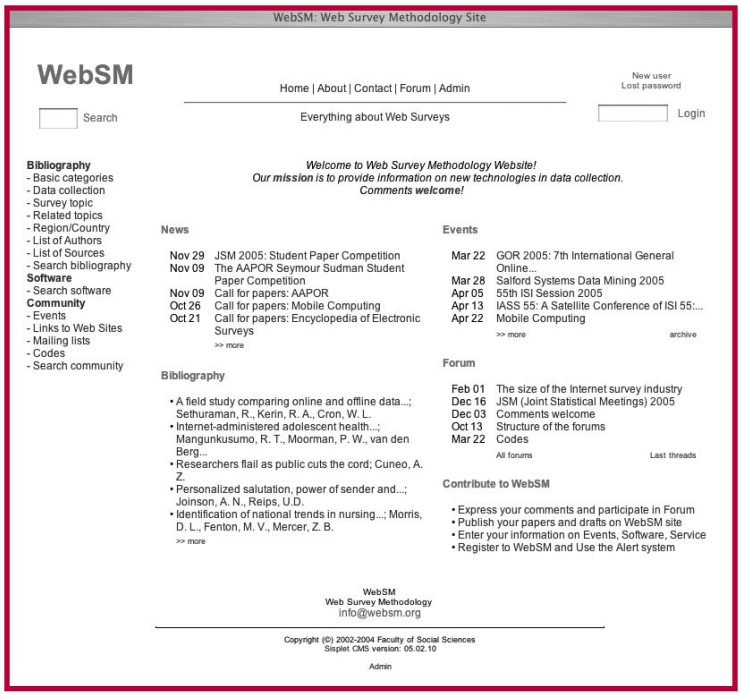
> Greetings! I am conducting research into graduate student use of information technology to complete required professional and academic assignments. I am particularly interested in the specific ways in which you may have used technology in your research and teaching, and the degree to which you have been asked to use specific software applications to support either your own work or the work of your supervising faculty member(s). Please take a few moments to follow the link below to a brief survey I have constructed to gather information on these topics. Thank you for your help!

A message like this one might have been delivered directly to your In Box based on your listing on a departmental Web site, or it might have come to you because it was posted to an electronic discussion list to which you subscribe. Have you ever wondered how the researcher might report the results of a sampling plan for a population basically made up of "everyone on [insert name of electronic discussion list]"?

While these are overarching questions that each researcher must consider in the design of an online survey, there are also a number of useful tips for effective presentation of a survey instrument that can be found in works such as Dillman (2000), Dillman, Tortora, and Bowker (1999), and Schaefer and Dillman (1998). For even more information on survey research design, visit WebSM: The Web Survey Methodology Site at http://www.websm.org/

➤ Confidentiality of Responses and Preservation of Privacy for Participants

Perhaps one of the most troubling issues related to the use of e-mail or the Web for the conduct of research is that of privacy. While this (like so many other issues considered in this handbook) is an evolving issue both for researchers and for policy makers, a number of initial steps can be identified if you wish to conduct responsible research in the networked environment.



The Consent Form

At the University of Kansas, the Human Subjects Review Committee for the Lawrence Campus (HSCL) oversees the responsible design of research that will include human subjects as participants. Detailed directions for preparing a research proposal that will meet their requirements for review are available online at http://www.research.ku.edu/kucr/forms/comp/hscl.shtml All KU researchers should be familiar with the HSCL Web site, and one should expect to find similar guidelines governing research design at any institution of higher education. Of particular interest to the researcher making use of ICT in the design and/or delivery of a survey instrument are the HSCL guidelines regarding "informed consent."

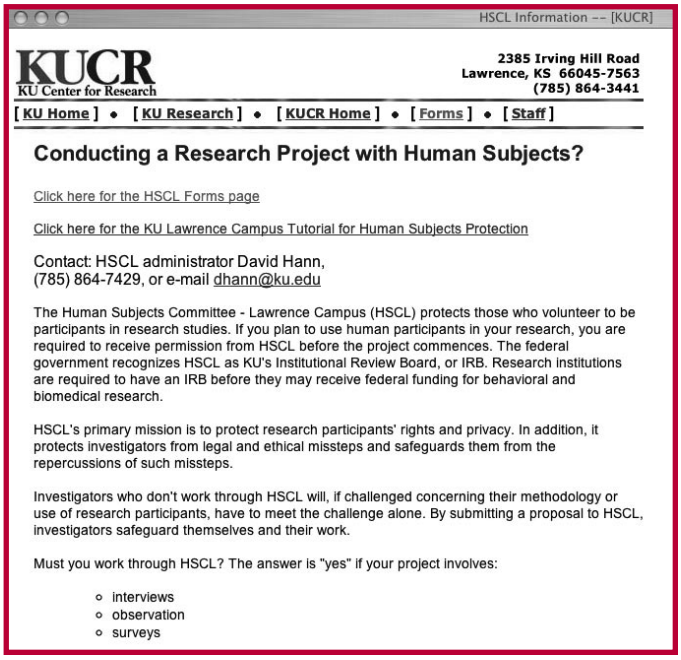
WebSM: The Web Survey Methodology Site
http://www.websm.org/

The National Cancer Institute defines "informed consent" first as a *document* that outlines: (1) the purpose of the research study; (2) the specific actions that will be required of participants to complete the study; (3) the benefits that may accrue to the participant as a result of engaging in the study; (4) the risks that the participant may face as a result of engaging in the study; and, (5) the rights and responsibilities of both the researcher and the participant. Informed consent is further defined as a *process* by which participants are kept informed about the progress of a study so that they may make decisions regarding their continued participation http://www.cancer.gov/clinicaltrials/conducting/informed-consent-guide/page2.

At the University of Kansas, HSCL provides a template for constructing an informed consent statement at http://www.research.ku.edu/kucr/forms/comp/hscl/hscl-con.pdf. Note, however, the following caveat regarding informed consent in the electronic environment:

If investigators wish to use the Internet or electronic mail to conduct surveys some extra precautions are necessary. Because respondents' electronic addresses are typically provided when they return such surveys by e-mail, PIs should devise a plan for stripping such information to maintain the confidentiality and anonymity of respondents' names. Also, it is possible that, through intent or accident, someone other than the intended recipient may see the subject's response. The investigator should therefore inform subjects that, while effort will be made to protect subjects [sic] privacy, security and confidentiality of participants' responses cannot be guaranteed. http://www.research.ku.edu/kucr/forms/comp/hscl/hscl-ins.doc

While the above guidelines clearly address issues related to confidentiality in an e-mail survey, there are additional precautions that might be taken with a Web-based survey that includes electronic submission of data. An excellent guide to adapting traditional informed consent measures to the Web environment can be found in the "Web-Based Studies" section of the "Research Compliance" page on the Indiana University at Bloomington Web site http://www.research.indiana.edu/rschcomp/informed.html.



http://www.research.ku.edu/kucr/policy/comp/hscl.shtml

Guidelines for Assuring Informed Consent in the Electronic Environment

1. Include all information in your e-mail or Web-based form that you would have included in a traditional form, e.g., name and contact information for principal investigator, date of approval of instrument by Human Subjects Review, contact information for Human Subjects Review.
2. Make sure that study participants will be able to print a copy of the informed consent statement for their own records that includes all required information.
3. Include separate statements regarding one's consent to participate in the study above any "Accept" or "Submit Survey" buttons that will result in information being delivered to the researcher.
4. Provide multiple methods for study participants to contact the researcher so that there is never a requirement to attach identifying information such as an e-mail address to survey responses.
5. Make plans for secure preservation of digital data.

Retention of Data and Preservation of Confidentiality

Another protocol commonly defined in an informed consent statement is the researcher's plan for retention of data and preservation of confidentiality. A typical statement in a research study that employs individual or group interviews, for example, might once have looked like this:

Data will be kept confidential through the use of pseudonyms and aggregate data in the report of the research. Only the investigator and a professional transcriptionist will have access to original records of the data (e.g., audiotapes), and both original records and transcriptions will be maintained in a secure file by the researcher. Original records and transcriptions will be retained in a secure file by the researcher for a period of five years and will then be destroyed.

What is the digital equivalent of a "locked storage cabinet" for confidential data? As has been the case throughout this handbook, there is no single answer, but there are a number of factors to consider.

We will return to the broader issue of planning for the long-term preservation of digital information later in this handbook.

RESPONSIBLE USE OF OTHERS' WORKS

"Fair Use" and Beyond in the Networked Environment

The University of Kansas encourages and supports the production of intellectual property by faculty and students for the benefit of the institution and society. All users of print and electronic information have a personal responsibility to recognize and honor the intellectual property created or owned by others. The following sections of this handbook provide basic background information about copyright and guidelines for the use of copyrighted material in the networked environment. Copyright law is complex and, as elsewhere, our focus in this chapter is on issues related to the use of electronic materials. For additional information, please contact copyright@ku.edu or visit http://www.copyright.ku.edu/.

➤ Copyright Basics

Copyright is a limited form of monopoly protection provided by the laws of the United States, primarily through *Title 17* of the U.S. Code, also known as the "Copyright Act" http://www.law.cornell.edu/uscode/html/uscode17/usc_sup_01_17.html. Copyright law affords protection for a finite period of time to the creators of "original works of authorship," including works of literature, musical compositions, and a variety of other works.

Copyright protects a vast range of materials

Copyright protects: books, articles, photographs, paintings, sculpture, software, Web sites, architecture, pantomimes, ballets, music, sound recordings, and even doodles, scribbles, and graffiti.

Copyright protection applies to: any "original work of authorship" that is "fixed in any tangible medium of expression." Protection automatically extends to any qualifying work, whether published or not, and whether created in the U.S. or in almost any country of the world.

Copyright protection does not apply to: facts, slogans, titles, and simple phrases. Also exempt from protection are works of the U.S. government.

Source: Copyright Management Center. Indiana University – Purdue University at Indianapolis. (2002). Copyright quickguide. Retrieved January 26, 2005, from http://www.copyright.iupui.edu/quickguide.htm.

Copyright protection is secured automatically as soon as a work is created in a fixed form (even if that form is simply pixels on a screen). Neither a copyright symbol (©), nor registration of copyright is required to secure copyright protection. With a few significant exceptions, the creator of a work (literary, musical, photographic, digital, etc.) is the owner of its copyright. Chief among these exceptions are when:

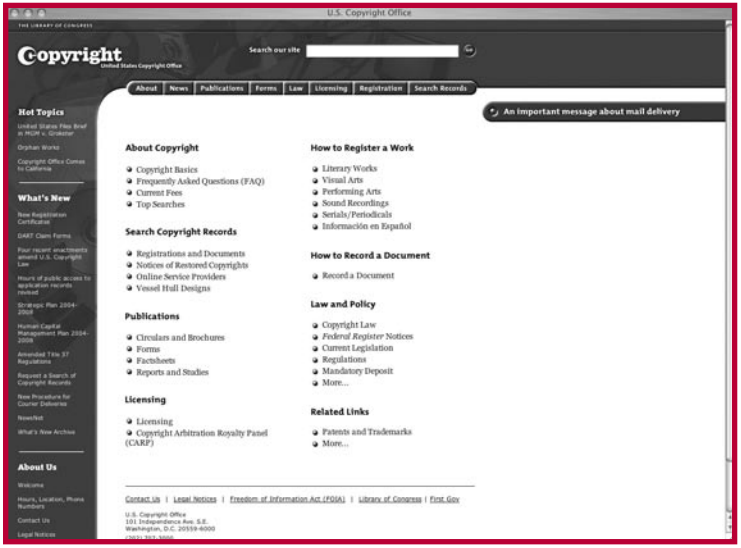
1. the work is in the *public domain*;
2. the work was created *for hire*;
3. copyright to the work has been *transferred*.

Works in the public domain

A work may be considered to exist in the "public domain" if its limited term of copyright protection has expired or if it failed to meet the initial requirements for copyright protection. Works in the public domain may be freely adapted or reproduced. As noted above, publications of the federal government are also generally part of the public domain.

Work for hire

A work may be said to have been created "for hire" if it was created within the scope of an employee's position or was specially commissioned by the employer. In the case of work for hire, copyright is retained not by the author but by the sponsoring organization.



Copyright transfer

An author may choose to transfer his copyright to another individual or company as a condition of publication. Common practices of copyright transfer as part of the framework of scholarly communication are currently the subject of intense study, as are alternatives to those practices. Copyright transfer will be discussed in greater detail later in this handbook.

For additional basic information about the scope of copyright protections, common exceptions to copyright, and the legal framework surrounding

http://www.copyright.gov/

copyright, you may consult the Copyright Management Center at Indiana University-Purdue University at Indianapolis http://www.copyright.iupui.edu/, or the U.S. Copyright Office http://www.copyright.gov/.

What are my copyrights?

According to Section 106 of the Copyright Act, the "exclusive rights in copyrighted works" include the right:

1. to reproduce the copyrighted work in copies or phonorecords
2. to prepare derivative works based upon the copyrighted work
3. to distribute copies or phonorecords of the copyrighted work to the public by sale or other transfer of ownership, or by rental, lease, or lending
4. in the case of literary, musical, dramatic, and choreographic works, pantomimes, and motion pictures and other audiovisual works, to perform the copyrighted work publicly
5. in the case of sound recordings, to perform the work publicly by means of a digital audio transmission

Source: Legal Information Institute. Cornell University. U.S. Code collection. Retrieved January 27, 2005, from http://www.law.cornell.edu/uscode/

Fair Use

In higher education and elsewhere, the most common questions related to copyright protections revolve around the reproduction and distribution of materials. Common reasons for reproduction include distribution of materials for use in a classroom, placement of materials in a "reserve collection," or transmission of materials to colleagues, students, or others through electronic means (e.g., electronic mail). In most of these cases, reproduction and distribution of copyrighted materials for these purposes is permitted under the doctrine of *fair use*.

Fair use is defined in Section 107 of the Copyright Act as the right to reproduce copyrighted materials for the purpose(s) of "criticism, comment, news reporting, teaching . . . scholarship, or research." There are limits to the exemptions to copyright provided by the doctrine of fair use, however; while each case is different, there are four factors recognized in the Copyright Act as helping to guide decisions about fair use.

The "Four Factors" of Fair Use

1. The purpose and character of the use, including whether such use is of a commercial nature, or is for non-profit educational purposes.
2. The nature of the copyrighted work.
3. The amount and substantiality of the portion used in relation to the copyrighted work as a whole
4. The effect of the use upon the potential market for or value of the copyrighted work.

Source: Legal Information Institute. Cornell University. *U.S. Code collection*. Retrieved January 27, 2005, from http://www.law.cornell.edu/uscode/

At the University of Kansas—as at other institutions of higher education—many fair use exemptions to copyright protections are heavily influenced by the first of the four factors, i.e., educational purposes. Each case is different, however, and a comprehensive review of fair use is impossible in a handbook of this length. Moreover, copyright law is not static and new legislation continues to shape the guidelines for responsible use of work created or owned by others. Two of the most significant revisions to copyright law related to the use of digital content will be outlined later in this chapter. For further information about the use of copyrighted materials for educational purposes, see the Copyright Management Center's "Checklist for Fair Use" http://copyright.iupui.edu/checklist.htm.

➤ Copyright and the World Wide Web

"Fair use" is a phrase that is familiar to many students, teachers, and researchers, but it is a concept that has been stretched in recent years by increasing use of the World Wide Web and other electronic media both to reproduce and to disseminate materials protected by copyright.

When discussing the status of copyrighted materials on the World Wide Web, we must first distinguish between the "open Web," or those millions of Web pages that are freely available to anyone who has access to the Internet through a Web browser such as Firefox or Microsoft Internet Explorer, and the "proprietary Web," or those additional millions of Web pages for which one must pay a subscription fee—or obtain a license—to access. For most academics and professionals, access to licensed works (databases, journals, and books) is provided by the college, university, or corporate library.

Copyright and the Open Web

In general, copyright applies to all materials that might be posted to a freely available Web site, including text, images, video, and music files. As noted earlier, copyright protection is extended as soon as a work is created in a "fixed form" (including a Web page), and neither registration of copyright nor display of the copyright symbol is required for protection to exist. In some cases, a Web site may include a statement of copyright ownership or guidelines under which materials may be used by others, but these may not always be evident to the casual user of the Web.

The ambiguous authorship of many materials on the open Web can make identifying copyright holders difficult. The digital difference in the medium, however, lies not in any change to copyright basics but in the tendency of many users of the World Wide Web not to pay as strict attention to them in the electronic medium as they might in more traditional print media. In the case of the proprietary Web, by contrast, issues of copyright have become increasingly intertwined with those of licensing. Here is an area of emergent legal precedent and professional practice with which all scholars and researchers must become familiar if they are to engage in responsible use of work created or owned by others.

Licensing for Access to Copyrighted Works: Electronic Journals and Databases

Most of the electronic journals and databases available from a corporate or academic library's Web site have been *licensed* from the publisher by the subscribing library for non-commercial use by the institution's faculty, staff, students, and on-site visitors for educational or research purposes. The license is a contract between an intellectual property owner (or licensor) and a subscriber (the library or the university). In addition to setting business terms, licenses typically define who may use the journal or database and what those users may and may not do with the content. The license may override the rights otherwise granted by copyright law, and terms of use may be more restrictive than those provided by fair use.

Frequently Asked Questions about Licensed Databases and Journals

Q. What use restrictions may be set by license agreements?

A. Although each license is unique, common restrictions found in licenses for digital information products include the following:

- The content may be used only for non-commercial educational, clinical, or research purposes;
- Individuals who are not affiliated with the library that has licensed the product may not use the content or may use content only when physically present in a library building;
- Printing and downloading of e-resources are generally subject to copyright restrictions;
- Altering, recompiling, systematic or programmatic copying, reselling, redistributing or republishing of electronic content are typically prohibited;
- Systematic downloading of substantial portions of an electronic title is prohibited.

Q. Who is an authorized user?

A. Generally authorized users are the registered students, faculty, and staff of the institution purchasing the electronic resource. In many cases, authorized users also include members of the public who use the e-resource on library premises.

Q. May I download an entire journal issue?

A. NO. In addition to breaking the terms of most licenses, this is a violation of basic copyright principles.

Q. May I e-mail full-text articles to individuals who are not affiliated with KU?

A. As a general rule, you may not e-mail full-text articles to unauthorized users.

Q. What could happen if I don't follow these rules?

A. Most universities have policies that define the consequences for violation of intellectual property rights. At the University of Kansas, the University may suspend the delivery of services to any individual for violation of the policy on Responsible Use of Electronic Information Resources, which may be found in the Information Technology Policy Library at http://www.policy.ku.edu/it/. In addition, publishers monitor the usage of the resources they license. Publishers can suspend access to a database for an entire campus—and have done so—based on abuses committed by a few individuals.

➤ The Visual Difference: Images and Artifacts in Museums, Archives, and Special Collection Libraries

Researchers in many disciplines—including history, art history, anthropology, religious studies, and sociology—use cultural artifacts such as paintings and drawings, manuscripts and early printed documents, pots and tools as primary evidence for their interpretations and often wish to include images of these artifacts in their publications and teaching. Such images are increasingly available on open-access Web sites and in specialized licensed databases. However, even if the rules of copyright do not apply to the artifact, other kinds of ownership rights may limit permissible use.

Rights of the Repository: Museums, Libraries, and Archives

The *images* of artifacts found on the Web, in a database, or in printed books may be protected by copyright and should not be reproduced indiscriminately, even if the originals that are depicted are in the public domain (e.g., a 15th-century painting or a 17th-century printing of a poem). Copyright to the images may be owned by the repository that hired the photographer (depending on their degree of originality), and professional courtesy requires that reproduction rights be requested in any case. Museums and other repositories of unique artifacts typically set special conditions for the reproduction of images of the objects that they own. These repositories have an interest in assuring that copyright (if any) is respected, the reproductions are faithful, and the objects are accurately described. In addition, reproduction fees often provide a source of revenue.

Researchers who wish to publish an image of an object from a museum, archive, or library should request permission from the repository (look for a "Rights and Reproductions" page on the repository's Web site). Although guidelines vary from one repository to another, they usually specify how details or close-ups from the

Spencer Museum of Art
http://www.spencerart.ku.edu/

original may be handled, what kinds of changes in the image or its color are permitted, and how the item should be cited. The guidelines set by the Spencer Museum of Art at the University of Kansas are typical.

Who Owns What?

A *Repository* (or Private Collector) may own the object (manuscript, painting, artifact) and control the conditions under which images of it can be reproduced.

A Photographer (or his/her Employer) may own the copyright to a photographed image of the original object, even if the object is in the public domain, if the photograph embodies a sufficient degree of originality.

An *Author or Artist* may own the copyright to the original work "fixed" in the object.

Locating Rights Owners

Locating the copyright owner or owner of other reproduction rights—whether textual or visual—is not always straightforward. If you need an image of an artifact to illustrate a publication or public lecture, start with the repository that owns the object. Museums and archives can often locate authors and artists for works under copyright protection. Other resources for locating rights holders include:

The Artists Rights Society, a copyright, licensing, and monitoring organization for visual artists in the United States. It represents the intellectual property rights interests of over 30,000 visual artists (painters, sculptors, photographers, architects, and others) and estates of visual artists from around the world. http://www.arsny.com/index.html

The Copyright Clearance Center, which manages the rights to over 1.75 million works and represents more than 9,600 publishers and hundreds of thousands of authors and other creators. http://www.copyright.com/

The WATCH File (Writers, Artists, and Their Copyright Holders), a database containing the names and addresses of copyright holders or contact persons for authors and artists whose archives are housed in libraries and archives in North America and the United Kingdom. http://tyler.hrc.utexas.edu/index.cfm

See also "Locating U.S. Copyright Holders:" http://tyler.hrc.utexas.edu/us.cfm

Conditions Under Which Permission is Granted to Reproduce Works of Art in the Collection of Spencer Museum of Art

1. Permission is only granted for the usage, publication, and edition requested. Separate application must be made for each additional language edition and subsequent edition in the same form.
2. Use of photograph(s) is limited to the publication requested. No other use may be made without additional permission.
3. Reproduction from any photograph or other printed material not supplied by the Spencer Museum of Art is strictly prohibited.
4. Transparencies are loaned on a rental basis and must be returned after use. Rental fee must be paid for each 3-month period or portion thereof, regardless of whether the transparency is reproduced. Full replacement cost will be charged in case of loss or damage. The borrower may not make duplicate transparencies.
5. Application to reproduce a detail from a work will be considered only upon receipt of a sketch or photograph marked to show the area to be reproduced. The caption must include the word "detail."
6. Unless the application is for a detail, each object must be reproduced in its entirety and the reproduction must not be bled off the page, cropped, or altered in any way.
7. No image, text, or other printing may be superimposed on the reproduction. Reproductions may not be printed in colored ink or on colored stock without permission.
8. The publisher is to provide the Spencer Museum of Art with two complete copies of the publication in which the reproduction appears, without charge. The Museum may order, at the time of printing, any overrun of the reproductions it may desire, to be paid for at cost.
9. The credit line of the object requested must be shown in immediate proximity to the reproduction or in the section within the publication devoted to acknowledgements. If the reproduction is on film, videotape, or other non-printed medium, full credit must be included in the credits and in any accompanying printed materials.

Source: Spencer Museum of Art. University of Kansas. (n.d.). *Photo rights and reproductions.* Retrieved January 25, 2005, from http://www.ku.edu/~sma/information/rightsandrepro.html

➤ Beyond Section 107: New Legislation Governing Use of Digital Content

The rise of the World Wide Web and the increasingly diverse mechanisms by which digital information can be created and disseminated have created a number of new issues for those who wish to make responsible and appropriate use of materials created or owned by others. Two recent pieces of legislation are key to any understanding of the emerging digital difference in copyright law.

The Digital Millennium Copyright Act (Public Law 105–304)

The Digital Millennium Copyright Act (DMCA) was passed by Congress in 1998 and took effect in 2000. The primary purpose of the act was to bring U.S. copyright law into compliance with the requirements of the World Intellectual Property Organization. Organized into five titles that address issues including technological mechanisms by which copyright holders may protect their materials, the use of digital information in distance education programs, and the rights and responsibilities of libraries and other repositories related to the preservation of digital information, the DMCA reinforced many copyright holders' legal protections as regards digital information.

DMCA highlights

The Digital Millennium Copyright Act (1998):

1. prohibits the circumvention of protective measures put into place by copyright holders (e.g., data encryption)
2. prohibits the removal of information imbedded in digital content by the copyright holder (e.g., digital watermarks)
3. permits libraries to make up to three "preservation copies" of a copyrighted digital work
4. permits digital preservation ("migration") of material stored in an obsolete medium

The DMCA also provides for limits to the liability that an Internet Service Provider may have with respect to information residing, at the direction of a user, on a system or network that the service provider controls or operates. At the University of Kansas, this facet of the law protects the university from liability in the case of an infringement of copyright by an individual with access to the institutional Web site. In order to meet the requirements of the DMCA, the host institution must identify a "university agent" responsible for receiving complaints related to alleged infringements of copyright. On the Lawrence campus the

"university agent" is the Vice-Provost for Information Services and at the KU Medical Center it is the Associate Vice-Provost for Information Resources. Contact information is available online at http://www.copyright.ku.edu/DMCA.shtml.

The Technology, Education, and Copyright Harmonization Act [17 USC 110 (2)]

The Technology, Education, and Copyright Harmonization (TEACH) Act of 2002 provided for a significant revision of Section 110 (2) of the Copyright Act to more clearly define the exemptions to exclusive copyrights available to educators wishing to make use of copyrighted materials in distance education programs. As Crews (2002) notes, institutions of higher education gained significant expansion of use rights under the TEACH Act, but only if they comply with many specific individual and institutional requirements. Again, space does not permit an extensive discussion of this complex piece of legislation.

TEACH Act highlights

The Technology, Education, and Copyright Harmonization Act (2002):

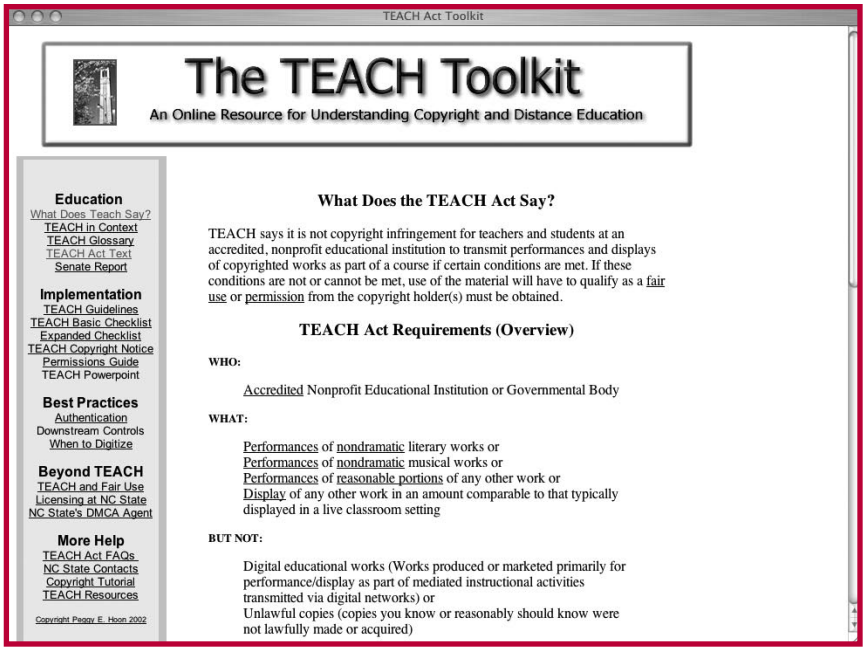
1. expands the range of materials that may be used, performed, or displayed in the electronic environment
2. expands the definition of a "receiving location" eligible for recognition as a distance learning site
3. allows an institution to retain copies of transmitted content and to make such content available to enrolled students for a given amount of time
4. allows for limited digitization of analog works in order to facilitate instruction if digital format is not already available

Like the DMCA, the TEACH Act also requires institutions to follow a lengthy set of guidelines in order to receive the benefits of exemption from copyright protections that would otherwise be in force. Among the most familiar of these to individual students and teachers is that digital content be protected from open access by a course-level password that assures that access to copyrighted materials will be limited to enrolled students in a given class during a given semester. For additional information, please consult Crews (2002) or the North Carolina State University's "TEACH Act Toolkit" http://www.lib.ncsu.edu/scc/legislative/teachkit/.

➤ Citing What You Use

The final demonstration of responsible use of work authored by others in your research is appropriate attribution. Earlier in this handbook, we discussed the problem of plagiarism (both traditional and digital) now facing students, faculty, and administrators on the college campus. One of the basic safeguards against plagiarism, and one of the foundational assumptions of responsible use, is appropriate acknowledgement and attribution of authorship of source text and materials.

At the University of Kansas, both the KU Libraries and the KU Writing Center provide instruction in how to cite resources appropriately in various styles. Both also provide print and electronic resources that you may either incorporate in your teaching or to which you may direct your students. Please consult the "University of Kansas Policies and Resources" section of the bibliography for specific references.



North Carolina State University's "TEACH Act Toolkit" http://www.lib.ncsu.edu/scc/legislative/teachkit/.

RESPONSIBLE RESEARCH SHARING

Maximizing Scholarly and Social Impact by Maximizing Access

Scholarship is a public good. Research conducted by college and university faculty is often funded directly through grants from state or federal government or through private foundations whose exemption from taxation requires other sectors of society to compensate for the loss of their tax revenue. Academic institutions are also exempt from taxation. As a consequence, researchers are expected to disseminate the results of their work, to make those results available as broadly as possible for the benefit of society at large.

Dissemination of scholarly work supports other goals as well: it is the means by which other researchers critique, test, and validate a research finding or interpretation, or build on it to create new knowledge and new understanding. When other scholars cite your results in their published work, your own career may advance.

➤ Copyright and Responsible Stewardship of Your Intellectual Property

The legal foundation that makes sharing of your scholarship possible is copyright, the law that determines who may copy, publish, or perform a work and how that right may be transferred from the author to another party. It is a well-established tradition within U.S. higher education that faculty and students retain copyright ownership to most of the books and journal articles that they write (McSherry 2001). According to the University of Kansas *Intellectual Property Policy*, "the ownership of textbooks, scholarly monographs, trade publications, maps, charts, articles in popular magazines and newspapers, novels, nonfiction works, supporting materials, artistic works, and like works shall reside with the creator(s)" http://www.provost.ku.edu/policy/intellectual_property_policy. As a consequence, scholarly authors can control the conditions under which their works are made publicly available.

Journal and Book Publication: The Copyright Transfer Form

When a publisher accepts your manuscript for publication it will provide an *Author's Agreement* or *Copyright Transfer Form*. This is the legal instrument by which the author grants the publisher permission to publish, copy, or perform the work. Traditionally, by signing this form authors have transferred full ownership of the work to the publisher. This means that the author would have to receive the publisher's permission to copy or re-publish the work or to create a derivative work from it.

Increasingly, scholarly authors want to retain some of their rights. They want to be able to distribute copies of their works to their students and colleagues beyond the limits allowed by fair use, post their works on their Web sites, or incorporate the work into new teaching or research creations. Wider distribution leads to greater professional and scholarly impact.

At the University of Kansas, scholarly authors are **required** to request from the publisher the right to provide the University with a "royalty-free right to use the manuscript within the University in its teaching, research, and service programs, but not for external distribution" (3 b). In addition, authors are **encouraged** to request permission to post copies of articles in a publicly accessible repository or Web site.

Authors can request changes in the copyright terms of the Author Agreement, and many publishers have changed their forms to reflect these new practices. The SHERPA project at the University of Nottingham ("Securing a Hybrid Environment for Research Preservation and Access"), which tracks publisher policies at http://www.sherpa.ac.uk/romeo.php demonstrates that a majority of scholarly publishers permit some version of published journal articles to be made freely available by the author on an institutional Web site

Publisher Copyright Policies & Self-archiving

Statistics for 110 Scholarly Publishers (as of 23 January 2005)

RoMEO Designation	Archiving Policy	Publishers	%
Green	Can archive pre-print and post-print	52	47
Blue	Can archive post-print (final draft but not publisher PDF)	19	17
Yellow	Can archive pre-refereed pre-print	7	6
White	Archiving not supported	32	29

Summary: **71%** of publishers on this list formally **allow** some form of self-archiving.

Source: SHERPA.(n.d.). *Publisher copyright policies and self-archiving.* Retrieved January 30, 2005, from http://www.sherpa.ac.uk/romeo.pho?stats=yes

Retaining Your Rights: How to Amend A Copyright Transfer Form

The original contract may read:

The author transfers exclusively to the publisher copyright (including all rights thereunder) in the work for the duration of copyright and all extensions and renewals thereof, in all languages, throughout the world, and in any form or medium now known or hereafter developed.

You may write or type the following language on your contract (initial and date the change):

Notwithstanding the above language, I reserve the right to use this work in my teaching and research, for my colleagues at the University of Kansas to use this work in their teaching and research, and I also reserve the right to place an electronic copy of this work on a publicly accessible Web site.

Or you may sign and attach a copy of the form in the Appendix (available for download from http://www.ku.edu/~scholar/docs/KU_AUTHOR_Addendum.pdf).

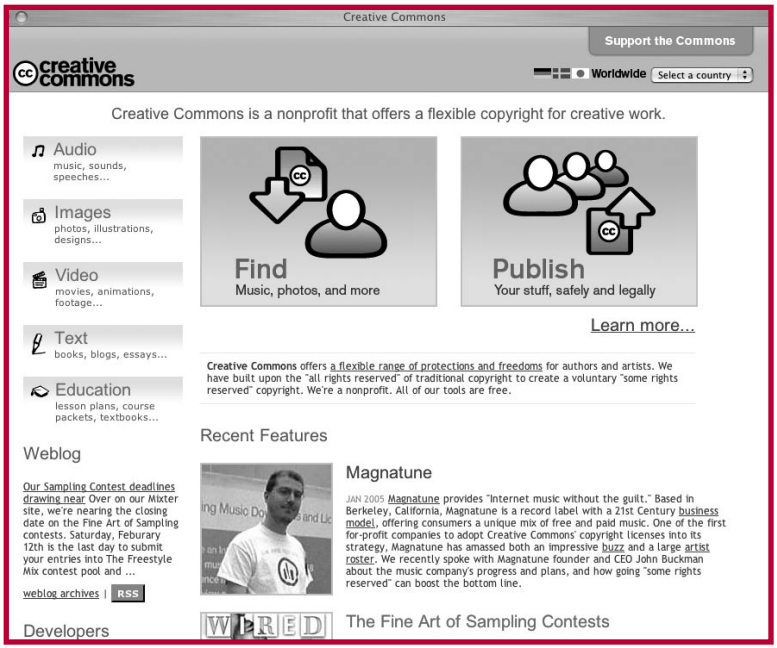
Pre-prints and Post-prints: Which Rights Are Which?

Publishers of scholarly journals vary in the degree to which they permit authors to post copies of accepted articles in publicly accessible repositories. Researchers are encouraged to reserve the right to make the post-prints available through a web site or open repository, but posting of earlier versions is also worthwhile if the publisher will not permit post-prints.

Pre-print only: "Pre-prints" are manuscripts of scholarly articles as submitted by the author for informal comment by peers, or as submitted to a publisher for formal peer-review in advance of publication. Posting pre-prints prior to publication invites valuable critique from colleagues. After publication, free availability of a pre-print may lead researchers to find (or request) and cite the published version.

Corrected manuscript: The publisher may permit you to post a copy of the manuscript as revised and corrected by editors and peer reviewers. Although this is not the paginated version most researchers will wish to cite, availability of the corrected manuscript may lead to greater visibility for the work and the published version.

Publisher's PDF (post-print): The publisher may permit you to post a copy of the final version of the article exactly as it will appear in the journal with all formatting and pagination.



Creative Commons
http://creativecommons.org

Beyond Copyright Transfer: Creative Commons Licensing

Authors, scholars, artists, musicians, and computer programmers often want to define their rights more precisely than traditional contracts allow. They want to permit certain kinds of uses of their work and restrict other uses. A new organization, Creative Commons, has developed a variety of legally sound models for doing this. See http://creativecommons.org for more information.

Creative Commons Licensing Categories:

- *Attribution:* You let others copy, distribute, display, and perform your copyrighted work —and derivative works based upon it—but only if they give you credit.
- *Noncommercial:* You let others copy, distribute, display, and perform your work—and derivative works based upon it—but for noncommercial purposes only.
- *No Derivative Works:* You let others copy, distribute, display, and perform only verbatim copies of your work, not derivative works based on it.
- *Share Alike:* You allow others to distribute derivative works only under a license identical to the license that governs your work.

Source: Creative Commons. (n.d.). About: Choosing a license. Retrieved January 30, 2005 from http://creativecommons.org/about/licenses/

➤ Responsible Choices for Effective Dissemination

Peer-reviewed books and journals are the mainstay of the scholarly publishing system. Peer review is the academy's best assurance that a researcher's work meets the intellectual and methodological standards set among the discipline. Most scholarly disciplines recognize a hierarchy of quality and prestige within journals and publishers, and publication in a journal of higher prestige is likely to count for more when tenure or promotion decisions are being made.

Most researchers naturally want to publish with the journal or book publisher with the highest prestige. However, this may limit the audience for their work. Most researchers rely on academic and research libraries for access to these publications, and since the 1980s, price increases for scholarly journals have significantly outpaced increases in library budgets leading to widespread cancellations of journal subscriptions and reductions in the number of monographs purchased for library collections.

Publishers make many choices that affect the accessibility of your work. In 2000, research libraries subscribed to 7% fewer journals than they did in 1986 but spent three times as much on them. At the same time, the number of scholarly books purchased by research libraries dropped from a median of 32,697 titles purchased in 1986 to 27,059 titles in 2001. In addition to setting prices, publishers also set the licensing terms under which libraries and the users of libraries can access and make use of electronic journals and books in electronic form. —*Source: Case, M. M. (2001). The impact of serial costs on library collections. ARL Bimonthly Report, no. 218. Retrieved January 21, 2005, from http://www.arl.org/newsltr/218/costimpact.html.*

"We analysed 119,924 conference articles in computer science and related disciplines.…The results are dramatic, showing a clear correlation between the number of times an article is cited and the probability that the article is online. More highly cited articles, and more recent articles, are significantly more likely to be online, in computer science"—S. Lawrence, "Free Online Availability Substantially Increases a Paper's Impact." —Source: Nature 411, 521 (31 May 2001): http://www.nature.com/

What Can Researchers Do to Improve the Accessibility of Their Work?

Not all journals in the same discipline cost the same, nor do all journals show the same level of price increase year to year, nor do all journals impose use-restrictions that are narrower than the fair use guidelines of copyright law. Choices made by authors and editors regarding the journals in which they publish or for which they provide editorial service can directly affect the accessibility of their work and can also influence the pricing and access policies of those journals and publishers. Scholarly literature is largely written by scholars for other scholars; the research community should influence the conditions under which it is made available.

Nature 411, 521 (31 May 2001): http://www.nature.com/

Five Steps to Responsible Authorship

1. Before you submit a manuscript, check the pricing policy of the journal at its web site or in the *Ulrich's Periodicals Directory* (be sure to check the library subscription price, not the price for individuals). How does the cost compare to other journals in your field with similar impact and frequency? Ask a librarian about the publisher's access policies. Consider publishing in a journal that is more accessible to the readers you want to reach.
2. Post a pre-print of your manuscript in an open-access disciplinary or institutional repository and negotiate with your publisher for the right to deposit a post-print.
3. Become a savvy consumer. Consider price, value, and local use when you advise the library on journal purchases and cancellations.
4. If you are a journal editor, investigate the pricing, access, and other business practices of your journal. Lobby the publisher if change is needed.
5. Discuss the issues of price, access, and the future of scholarly communication with your librarian and within your professional association. Learn about alternatives to commercial publication.

Source: Adapted from *Create Change.* (2003). Retrieved January 29, 2005, from http://www.createchange.org/faculty/faq/scomm.html

Open-access Journals

The inequities of access created by high journal prices and the potential created by digital technology for expanding access have led to experimentation with new business models for journal publishing. Instead of generating revenue through subscriptions—which limits access to those readers who can pay (or whose employer can pay on their behalf)—some journals are finding revenue from sources other than subscription and freely opening their content to all readers via the web. The *Directory of Open Access Journals* catalogs 1,424 peer-reviewed journal titles (as of January 23, 2005; see http://www.doaj.org/).

In all other ways, open-access journals are like subscription-based journals. Their quality can be judged by their editorial boards, their peer-review policies, the articles they publish, and the frequency with which those articles are cited in other research. Impact studies have indicated that open-access journals and articles are at least as likely to be cited as subscription-based journals and articles, with some studies suggesting that they are cited more frequently (Harnad 2004; Lawrence 2000; Testa 2004).

Open-access Repositories: Institutional and Disciplinary

Digital repositories are being developed at universities and research centers around the world to create open access to scholarly work. Some repositories represent a whole university. Only faculty and students associated with the university can contribute material, although everyone may read it. Other repositories are organized around a specific discipline, with contributors from many different universities and research centers.

In addition to pre-prints and post-prints, repositories may hold other kinds of research and scholarly material that have traditionally not been included in publications: datasets, lengthy tables, interview transcripts, catalogs, and other sorts of appendices that a researcher may wish to cite but not include in a published paper or book. Many scholars already post such materials on their personal or departmental Web sites. However, the curatorial processes of long-term management of files and directories can be handled more efficiently by librarians and other information professionals, allowing the researcher to focus on his or her scholarly work (Lynch 2003). Moreover, traditional Web-based addresses are susceptible to change (resulting in the all-too-familiar "404" error), whereas repository software can offer more durable digital addresses (DSpace Federation 2003).

Examples of University-based Repositories:

Caltech Collection of Open Digital Archives, California Institute of Technology: http://library.caltech.edu/digital/

DSpace @ MIT, Massachusetts Institute of Technology: https://hpds1.mit.edu/index.jsp>

E-Scholarship, University of California system:http://repositories.cdlib.org/escholarship/

KU ScholarWorks, The University of Kansas: https://kuscholarworks.ku.edu

Examples of Discipline-based Repositories:

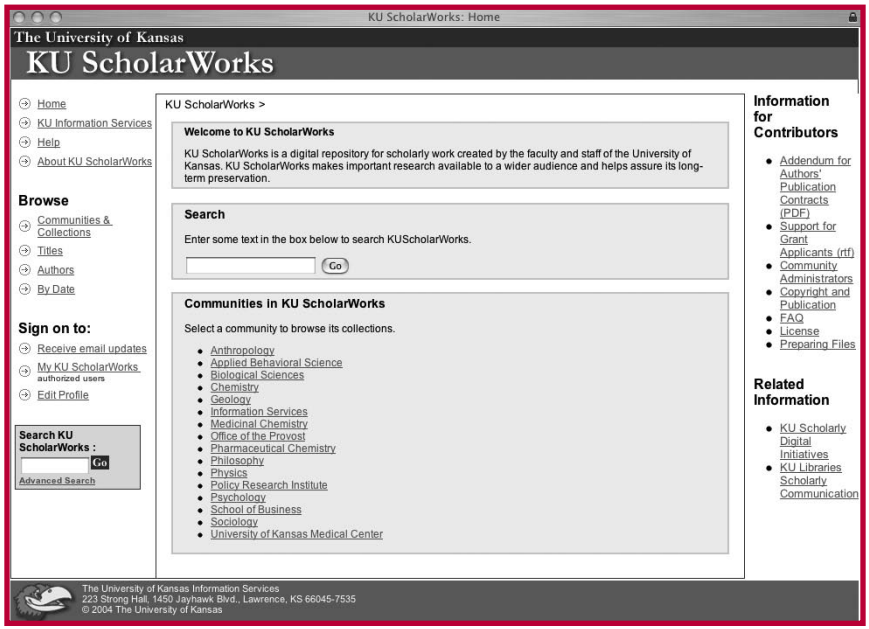
arXiv.org, e-Print archive (physics, mathematics, non-linear science, computer science, and quantitative biology): http://arxiv.org

Cogprints, Cognitive Sciences Eprints Archive: http://cogprints.org

Sharing Experimental Data

In many disciplines, experimental and quantitative datasets represent a vital intellectual asset. A full consideration of the ethical issues associated with assuring the integrity of experimental data—and the confidentiality of human subjects—is beyond the scope of this handbook. However, it is increasingly common for datasets to be shared widely within the research community and for granting agencies to require applicants to include a dissemination plan for their data in their proposal. Widespread sharing of data helps to assure validation of the research, guard against fraud, and encourage new research or interpretation. As with widespread sharing of research reports, sharing of data helps to maximize the social value and impact of the researcher's work.

In its *Final Statement on Sharing Research Data* (February 26, 2003: http://grants2.nih.gov/grants/guide/notice-files/NOT-OD-03-032.html), the National Institutes of Health stipulated that investigators seeking $500,000 or more in direct costs in any single year should include **a plan for data sharing**. In NIH's view, "data should be made as widely and freely available as possible, while safeguarding the privacy of participants and protecting confidential and proprietary data." The NIH policy applies to basic research, clinical studies, surveys, and other types of research supported by NIH and gives special priority to unique data that cannot be readily replicated. Research data covered by this policy are recorded factual material commonly accepted in the scientific community as necessary to document, support, and validate research findings—not summary statistics or tables but the data on which summary statistics and tables are based. For further information, see the NIH *Data Sharing Workbook* http://grants.nih.gov/grants/policy/ data_sharing/data_sharing_workbook.pdf from which some of this information was taken.



KU ScholarWorks, The University of Kansas
https://kuscholarworks.ku.edu

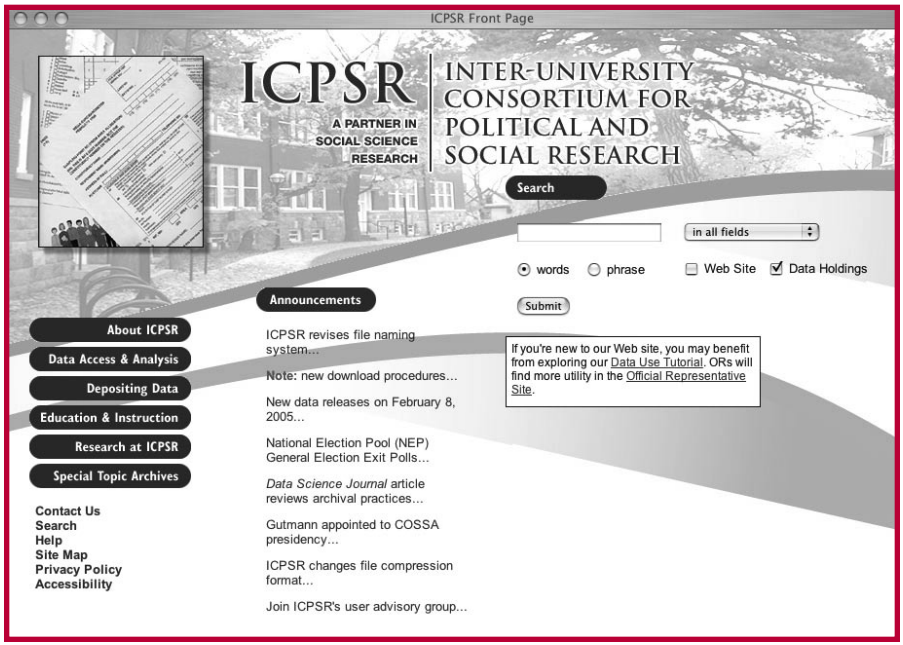
Types of Data Repositories

Data Archives are typically focused on a specific application or domain and often grant free, unrestricted access. Examples include the National Center for Biotechnology Information (NCBI) for DNA and amino acid sequences (see http://www.ncbi.nlm.nih.gov/Genbank/index.html), the Youth Risk Behavior Surveillance System http://www.cdc.gov/nccdphp/dask/yrbs at the Center for Disease Control, or the Inter-University Consortium for Political and Social Research (ICPSR) at the University of Michigan http://www.icpsr.umich.edu/.

Data Enclaves: Confidentiality and other factors may require that access to datasets be tightly controlled. Data enclaves provide this protection by requiring special registration or supervision of users. An example is the Research Data Center at the CDC's National Center for Health Statistics http://www.cdc.gov/nchs/r&d/rdc.htm.

Institutional Archives: Digital repositories hosted by universities on behalf of faculty and researchers are often hospitable to datasets.

Source: Adapted from National Institutes of Health (2004).



Inter-University Consortium for Political and Social Research (ICPSR) at the University of Michigan http://www.icpsr.umich.edu/

RESPONSIBILITY TO THE NEXT GENERATION

The Future of Digital Preservation

The improvements in accessibility and dissemination of scholarly work made possible by digital communication should extend to future generations of learners and scholars. Just as today's researchers learned from the work of previous generations, we have an obligation to assure that research materials in digital form are available to those who follow us.

The challenge of assuring long-term access to digitally encoded information has been widely acknowledged. Analog forms of representation—"print"—endure with relatively modest upkeep and can be read without intermediary technology. We can set aside a paper document and reasonably expect to find it readable years later. Digital information is not so forgiving. Digital information resides on physical media (tapes, disks) that are fragile and susceptible to corruption. More important, digital information requires intermediary technology (software and hardware) to read it—technology created in a marketplace that prizes proprietary control and innovation, resists standardization, and is often inattentive to backward compatibility. As a consequence, digital files and the hardware and software required to read them easily fall out of synchronization; the hardware and software may become obsolete and may no longer be available when the file is needed.

Fully effective digital preservation requires an administrative and technical infrastructure larger than individuals can support by themselves. Even so, the choices that authors and researchers make when they create and store documents, spreadsheets, databases, and other files can significantly improve the likelihood that their files will remain usable and findable over long periods of time. In a digital environment, careful management of information is a vital part of responsible scholarly practice.

Steps to Responsibility to the Next Generation

1. **Appraisal:** Ask yourself if the file that you're creating is one that you or someone else might want to use two years, five years, or more in the future. Remember that one of the virtues (and hazards) of digital files is that they can be modified and used for new purposes.
   - ✓ If yes, select your storage medium and file formats with care and document what you create.

2. **Select Secure Storage:** In general, files stored on networked hard drives maintained by professional administrators are more likely to remain accessible than files held on isolated disks (including the hard drive of your computer).
   - ✓ Ask your systems administrator how your data is stored and kept secure and what you need to do to insure that other people who need access to your data will indeed have access.
   - ✓ Consider depositing your dataset, working papers, or research publications in an institutional repository, data archive, or similar location. At KU, consider using the digital repository KU ScholarWorks http://kuscholarworks.ku.edu.
   - ✓ If you must store important files on a workstation hard drive, back up regularly onto high quality removable media, such as CD-ROM, DVD, or DLT tape. Consider making redundant backup copies, perhaps in more than one format, such as DVD and DLT, and storing in different buildings.

3. **Select Well-Supported Formats:** Some file formats are more likely to remain usable over long periods than others. In general proprietary formats—formats that are owned by for-profit companies—are less likely to remain usable than "open" formats because the source code for the application that created the file cannot be shared.

   Preferred formats with a high likelihood of remaining usable include:

   Text: PDF, Postscript, HTML, XML, ASCII (.txt), Rich Text (.rtf)

   Data: delimited ASCII, SGML, XML

   GIS files: delimited ASCII

   Image Masters: uncompressed TIFF, PNG

   Other Media: AIFF, WAV

   Databases: Databases are unique and pose special technical challenges for both preservation and future migration that require special consultation.

Common examples of formats with less likelihood of remaining usable:

Text: MS Word (.doc), Word Perfect (.wpd)

Data: MS Excel (.xls)

Image: Photoshop

Other Media: MS Powerpoint (.ppt)

4. **Describe What You Create:** Providing basic information about your files will increase the chances that they can be used over time. Try to include the name of the creator, the date created, the last date modified, the name of the file, and the format of the file.
   - ✓ For files stored on a server, create filenames and file folder titles that will be meaningful to users who come after you.
   - ✓ Create "Readme" files in .txt (ASCII) format to document what you have done.
   - ✓ Make data dictionaries that describe the data "fields" and expected contents—paper or online.
   - ✓ Add metadata (META tag) to HTML web documents to record the name of the author and the date.
   - ✓ For files stored on portable media (disks, DVDs, tape) attach a label and print out a directory.

Source: Digital Preservation Task Force. University of Kansas. (2004). Preservation planning for digital information: Final report of the HVC² Digital Preservation Task Force. Retrieved January 28, 2005, from http://hdl.handle.net/1808/166

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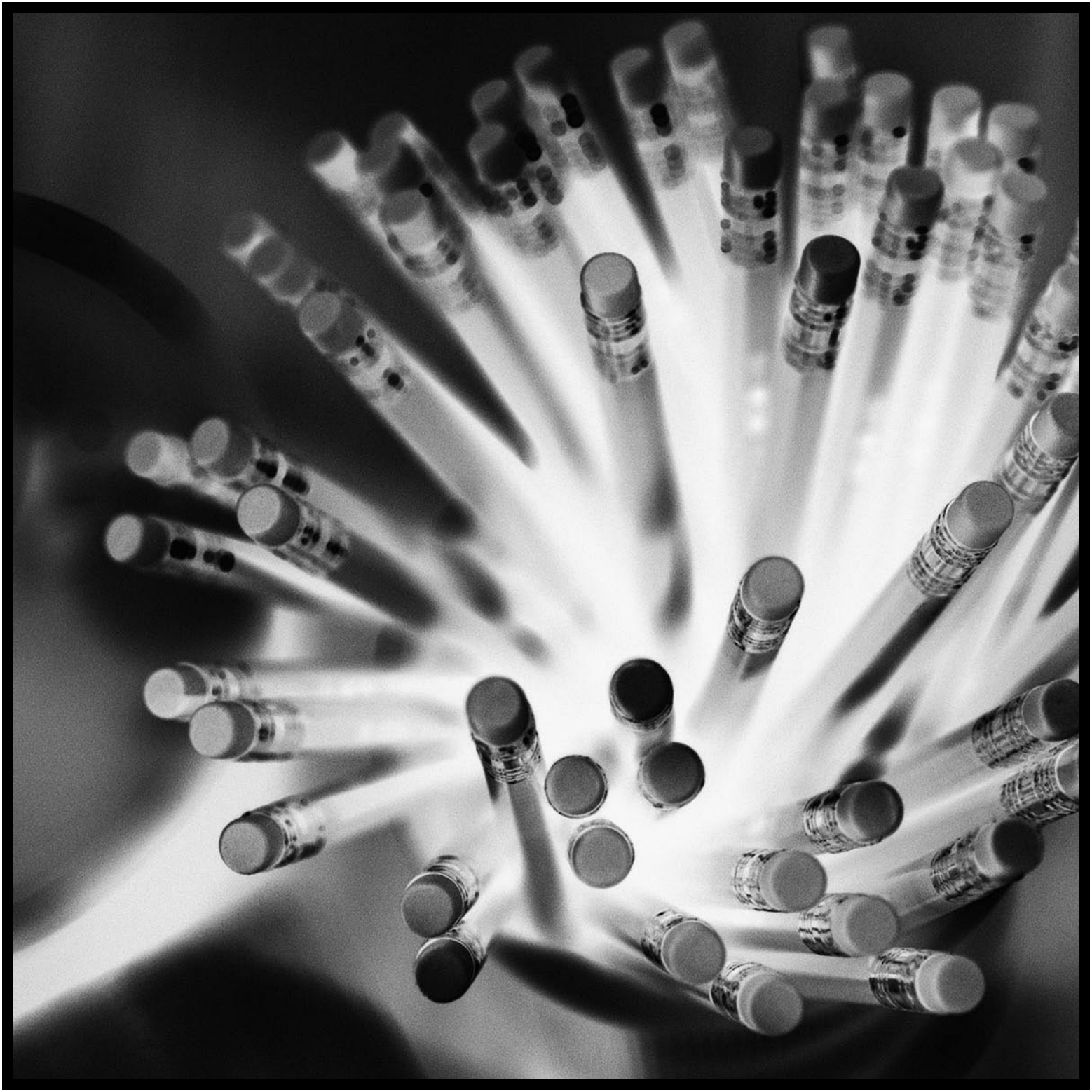

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➤ Core Web Sites

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